



COOPERATIVE EXTENSION
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SP 03-09

Invasive Weed Identification for Nevada

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Invasive weeds
are draining Nevada's
economic and natural resources

How to use this handbook to identify invasive plants in Nevada

1. Carry the handbook with you whenever you are out and about in Nevada. Put it in your glove compartment, pack, lunch box, or pocket.
2. Refer to it when you encounter a plant that you suspect may be an invasive plant.
3. Use the pictures and description to identify the invasive plant.
4. Fill out the survey form in the back of the book each time you identify an invasive plant in a new location. Feel free to photocopy additional forms.
5. If you have access to a Global Positioning System (GPS) unit, please note the positional coordinates.
6. On the reverse side of the survey form, draw a simple map to describe the site where the invasive plant is encountered. Put as much detail in the drawing as you like. Ask yourself when you finish, "Is the map drawn well enough that someone unfamiliar with the area could find the site and these plants?"
7. Send the completed form and map to: Dr. Wayne S Johnson, Department of Applied Economics and Statistics, Mail Stop 204, University of Nevada, Reno, NV, 89557-0105.

Additional Web Resources:

Nevada Department of Agriculture's Nevada Weed Action Committee
<http://agri.nevada.gov/nwac/index.htm>

University of Nevada Cooperative Extension
<http://www.unce.unr.edu/pubs.html>

Natural Resources Conservation Service
<http://www.nv.nrcs.usda.gov/plants.html>

Introduction

Invasive plants are displacing diverse plant communities and greatly impacting Nevada's natural and economic resources. Private and public land managers struggle to protect their lands from becoming unproductive, wildlife unfriendly monocultures of costly alien weeds.

To become a problem, invasive, competitive plants must be introduced into an area, they must establish and reproduce, and finally, they must disperse. Control or management is easiest and least expensive during the first two stages and difficult to impossible, and very expensive, during the last. Thus, the key to control is to identify potential weed infestations at very early stages and then eradicate them or prevent their spread.

This publication provides a tool to aid in the identification of invasive weeds that may be found in Nevada. Some of these weeds are not present in Nevada; however, their potential for invasion and establishment warrants concern. All of these weeds have invaded one or more of Nevada's neighboring states. New weeds in an area should always be identified and appropriate management initiated. In many cases, eradication may be possible, while some situations will warrant containment only. Contact a local plant professional in your county for advice and help.

All of the invasive plants in this booklet are listed as noxious weeds in the Nevada Revised Statutes, but not all noxious weeds are invasive. Therefore, not all of the noxious weeds in Nevada are included in this handbook. The distribution of these noxious plants in commerce is prohibited and their control or management is mandated.

Weed control recommendations frequently change. For current control practices, contact your county University of Nevada Cooperative Extension Educator or weed supervisor.

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<i>Centaurea iberica</i>	Iberian starthistle	10-11
<i>Centaurea maculosa</i>	Spotted knapweed	14-15
<i>Centaurea melitensis</i>	Malta starthistle/ Tocalote	16-17
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<i>Centaurea virgata</i> spp. <i>squarrosa</i>	Squarrose knapweed	22-23
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<i>Crupina vulgaris</i>	Common crupina	28-29
<i>Cynoglossum officinale</i>	Houndstongue	32-33
<i>Euphorbia esula</i>	Leafy spurge	44-45
<i>Hydrilla verticillata</i>	Hydrilla	50-51
<i>Hypericum perforatum</i>	St. Johnswort/ Klamath weed	42-43
<i>Isatis tinctoria</i>	Dyer's woad	36-37
<i>Lepidium latifolium</i>	Perennial pepperweed/ Tall whitetop	38-39
<i>Linaria dalmatica</i>	Dalmatian toadflax	64-65
<i>Linaria vulgaris</i>	Yellow toadflax	66-67
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Index of invasive plants by common name:

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Camelthorn	<i>Alhagi pseudalhagi</i>	46-47
Canada thistle	<i>Cirsium arvense</i>	26-27
Common crupina	<i>Crupina vulgaris</i>	28-29
Dalmatian toadflax	<i>Linaria dalmatica</i>	64-65
Diffuse knapweed	<i>Centaurea diffusa</i>	12-13
Dyer's woad	<i>Isatis tinctoria</i>	36-37
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(Several invasive species may exhibit more than one flower color, or the flower may fade to white.)

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Mediterranean sage	<i>Salvia aethiopis</i>	52-53
Perennial pepperweed/ Tall whitetop	<i>Lepidium latifolium</i>	38-39
Syrian beancaper	<i>Zygophyllum fabago</i>	72-73
<u>Yellow</u>		
Austrian fieldcress	<i>Rorippa austriaca</i>	40-41
Dalmatian toadflax	<i>Linaria dalmatica</i>	64-65
Dyer's woad	<i>Isatis tinctoria</i>	36-37
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St. Johnswort/ Klamath weed	<i>Hypericum perforatum</i>	42-43
Sulfur cinquefoil	<i>Potentilla recta</i>	60-61
Yellow starthistle	<i>Centaurea solstitialis</i>	20-21
Yellow toadflax	<i>Linaria vulgaris</i>	66-67
<u>Pink to purple</u>		
Common crupina	<i>Crupina vulgaris</i>	28-29
Musk thistle/Nodding thistle	<i>Carduus nutans</i>	8-9
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Squarrose knapweed	<i>Centaurea virgata</i> <i>spp. squarrosa</i>	22-23
<u>Purple</u>		
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Purple loosestrife	<i>Lythrum salicaria</i>	54-55
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Scotch thistle	<i>Onopordum acanthium</i>	30-31

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Common Name	Botanical Name	Pages
<u>Pinkish purple to maroon</u>		
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<u>Aquatic Plants</u>		
<u>White to light pinkish</u>		
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<u>White to Reddish</u>		
Hydrilla	<i>Hydrilla verticillata</i>	50-51
<u>Green Grasses</u>		
Green fountain grass	<i>Pennisetum setaceum</i>	56-57
Medusahead	<i>Taeniatherum caput-medusae</i>	58-59

Musk thistle

Asteraceae

Carduus nutans L.

Mature musk thistle plant.



Purple flower head with distinctive bracts (left).



Seedling with pale midrib and yellow spines on lobed margins (right).

Carduus nutans L.

Origin: Southern Europe and western Asia

Description: Introduced into the United States early in the twentieth century, musk thistle or nodding thistle has spread throughout the United States and Canada. A biennial or sometimes a winter annual, it stands 30 to 42 inches tall, but may grow to 72 inches tall. The dark green **leaves** have a light green central vein, deeply cut lobes, and a spiny edge. Directly attached to the stem, the narrow leaves are up to 8 inches long and alternately arranged. Single **flower** heads grow on the ends of long stalks, are 1½ to 3 inches in diameter, and usually bend over at the neck. The flowers are deep rose, violet or purple, and occasionally white. They have broad, spine-tipped bracts at their base, the bottom row or 2 of which are bent under or recurved. Flowering occurs from June to September. The **fruits** are $\frac{3}{16}$ inch long, shiny, and yellowish brown with a plume of white hair $\frac{3}{4}$ inch long at one end. Musk thistles reproduce by seed.

Habitat Preferences: Musk thistles germinate and grow under a wide range of environmental conditions. They invade pastures, range and forest lands, grain fields, stream and ditch banks, roadsides, waste areas, vacant lots, abandoned farmland, and very dry sites. It spreads rapidly and forms dense stands which crowd out other plants in both moist and dry sites.

Management: Tillage, hoeing, and hand pulling that severs the root below the soil surface before seed is produced is recommended. Mowing alone, especially a single pass, is not recommended, as seed will be produced. The introduced musk thistle weevil feeds on the seeds and limits the spread of this weed. Chemical control is effective and available. Good grazing management stimulates grass growth and keeps pastures and range-land healthy and more resistant to musk thistle invasion.

Purple and Iberian starthistles

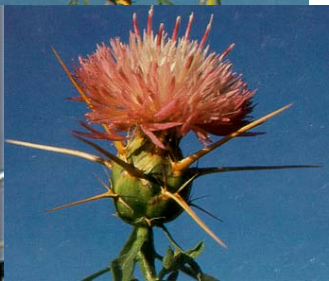
Asteraceae

Centaurea calcitrapa L. and *C. iberica* Trev. ex Spreng.

Mature Iberian starthistle plant.



Purple starthistle flower with spine-tipped bracts.



Iberian starthistle flower has a round head and light purple flower.

Centaurea calcitrapa L. and *C. iberica* Trev. ex Spreng.

Origin: Europe

Description: Purple starthistle grows 12 to 48 inches tall with a stout **taproot**, and a branched stem. Its **stems** and **leaves** are covered with cobwebby hairs that are lost or smooth out with maturity. Its lower leaves are deeply divided into oblong, linear segments, while the upper leaves are narrow and undivided. Tiny, clear globules are lightly pitted on the bottoms of its leaves. Rosette leaves at the base of the plant are deeply divided, with a circle of spines in the center of the older rosettes. The lavender to deep purple **flower** clusters have many heads $\frac{3}{4}$ to 1 inch long with spine-tipped bracts. Its **seeds** are about $\frac{1}{8}$ inch long, lack bristles, and are straw-colored with dark brown spots. Flowering occurs from July to October.

Iberian starthistle is very similar to purple starthistle, thus mature **seed** heads are needed to distinguish between them. Iberian **seeds** have a plume of flattened bristles about half as long as the seed at one end. Its **flowers** tend to be a lighter purple with a more round head than purple starthistle and occur in July and August. Both starthistle species reproduce rapidly by seed.

Habitat Preferences: Purple starthistle is more abundant on fertile sites, while Iberian starthistle establishes along streambeds or wet areas. Both weeds infest rangelands, pasture, and roadsides.

Management: Grubbing or digging may provide control of minor infestations and is most effective if done when the plant is a young rosette. Cutting the plant below the soil surface early in the growing season may be effective. Mowing is ineffective and may make the problem worse by spreading seeds or making the plant produce more flowers and seed heads. There are currently no biological controls for either of these starthistles. Herbicide application will be more successful if done in the spring.

Mature diffuse knapweed plant.



Flower bracts are yellow-spined with fine teeth along the spine's margin (right).



Seedling with finely divided leaves covered with short hairs (left).

Centaurea diffusa Lam.

Origin: Eurasia

Description: Diffuse knapweed is a finely-branched annual or short-lived perennial that grows 12 to 24 inches tall. The stiff **stems** are rough to the touch. Its **leaves** are covered with fine hairs and are finely divided except for the smaller entire leaves of the inflorescence. The plant produces narrow **flower** heads with white to rose or purplish flowers from July to frost. The margins of the bracts on the base of the flowers (involucre) are divided like the teeth of a comb. Each bract is tipped with a yellow, slender spine. The **seed** heads are persistent over winter. The seeds (achenes) are brown or grayish and lack a tuft of hairs (pappus).

Habitat Preferences: Diffuse knapweed infests roadsides, waste areas, dry rangelands, and disturbed sites. This highly competitive plant may dominate rangelands in Nevada that receive less than 15 inches of annual precipitation. It threatens to exclude many desirable species from pastures and rangelands. Fortunately, it is less competitive on shallow or very coarse-textured soils.

Management: The seed is commonly spread by equipment, vehicles, and the sale and movement of contaminated sand, gravel, and soil. Sanitation is the best line of defense. Pulling or digging small infestations of diffuse knapweed is effective but must be repeated until the seed bank is depleted, which takes several years. Mowing is not recommended as it may stimulate new knapweed growth and reduce competition from other plants. Cultivation controls this weed and grazing may be effective if done in the rosette through the bud stage. Burning may be used to remove plant debris and improve herbicide efficacy, but diffuse knapweed resprouts following fire if sufficient moisture is available. Several herbicides control it on rangeland, and there are 12 insects established in the western United States that attack diffuse knapweed. In the right environment, all these are effective in slightly reducing competitiveness.

Spotted knapweed

Asteraceae

Centaurea maculosa Lam.

Mature spotted knapweed plant.



Pinkish purple flowers have fringed bracts tipped with dark spots (right).



Spring rosettes have deeply lobed leaves (left).

Centaurea maculosa Lam.

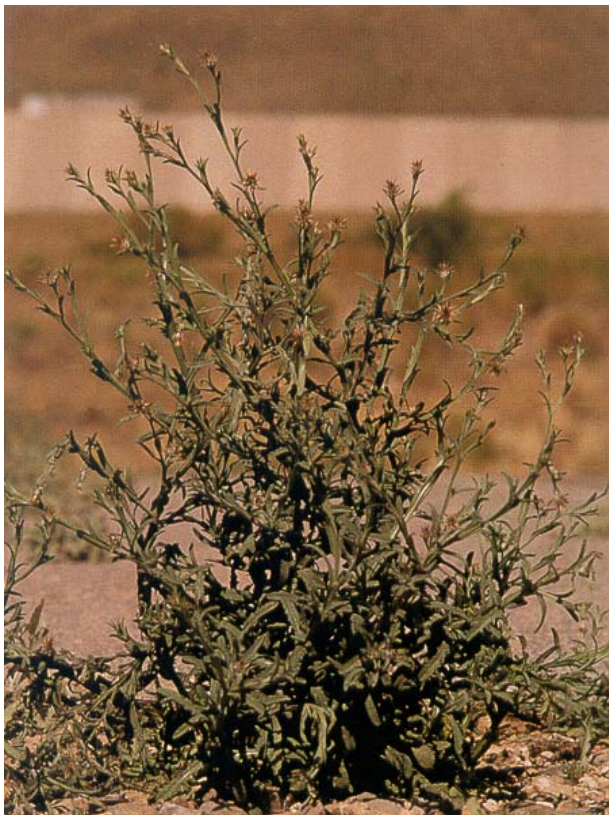
Origin: Eurasia

Description: Spotted knapweed is a biennial or short-lived perennial with a stout **taproot**. It has one or more branched **stems** and grows 12 to 36 inches tall. The **leaves** grow alternately along the stem. Basal leaves grow up to 6 inches long, are narrowly elliptic to oblanceolate, and are entire to pinnately parted. The leaves higher up the stem are pinnately divided. Single **flowers** develop at the end of branches with stiff bracts at their base that are tipped with a dark comblike fringe. The ray flowers are pinkish purple, or rarely cream-colored, and are produced from June to frost. The **seeds** are $\frac{1}{8}$ inch long and are tipped with a tuft of persistent bristles.

Habitat Preferences: Spotted knapweed has displaced diverse plant communities in Montana, Utah, and Wyoming. A threat to rangelands, knapweeds invade disturbed soil. Their early spring growth makes them competitive for soil moisture and nutrients. In Nevada, this plant may dominate rangelands that receive less than 10 inches of annual precipitation. There is evidence that knapweeds release chemical substances that inhibit germination and growth of surrounding vegetation.

Management: The seed is dispersed by vehicles, by sale of dried specimens for floral arrangements, and by movement of contaminated sand, gravel, and soil. As a first line of defense, prevent its movement. A variety of insects have been released on spotted knapweed to reduce seed production, including insects that damage the roots, shoots, leaves, and flowers. Burning and fertilization are ineffective. Cultivation, grazing, or mowing may have some positive effects. Careful hand pulling of small infestations can provide effective control if entire plants are removed before they produce seeds. Herbicides are available to control spotted knapweed, but regular reapplications are necessary until the seed in the soil have all germinated.

Malta starthistle plant.



Malta starthistle
stems are winged.



The dandelion-like
yellow flower has many
spiny bracts at its base.

Centaurea melitensis L.

Origin: Southern Europe

Description: Malta starthistle, or tocalote, is an annual or biennial. Erect **stems** are branched, hairy, rough, and winged. Basal **leaves** are lobed with a short stalk. Stem leaves are narrowly lanceolate, entire or sparsely toothed, and without a stalk (sessile). Ovoid **flower** heads are solitary on 2 to 3 clusters at the tips of the branches. On the flower bases, the bracts (phyllaries) are straw-colored and tinged with purple or brown, with sparse wooly hairs, ending in a flattened spine. Flowers are yellow and occur from April to September. **Seeds** are light brown with longitudinal lines, a pappus of unequal bristles, and a slightly hooked base. Both malta and yellow starthistles have yellow flowers and winged stems, but can be distinguished between as malta starthistle has shorter (less than $\frac{2}{5}$ inch) phyllary spines with a tiny pair of lateral spines about midlength along a few of the spines.

Habitat Preferences: Malta starthistle is found on open disturbed sites, grasslands, rangeland, open woodlands, fields, pastures, roadsides, waste places, and cultivated fields.

Management: Small infestations may be hand pulled over several years. Regular cultivation for several years is effective. Mowing and early season grazing change the plant to a prostrate form that may produce more flowers, so neither are recommended. Several insects may attack the seedhead, but their effectiveness is limited. Herbicides are available.

Mature Russian knapweed plant.



The bracts of the pinkish purple flowers have papery tips (right).



The fine hairs covering the toothed leaves of newly emerging plants gives them a blue-green color (left).

Acroptilon repens (L.) DC.

Origin: Eurasia; the Caucasus region between the Black and Caspian Seas

Description: Russian knapweed is a perennial weed. Propagated by seeds, this weed also forms dense colonies by adventitious shoots from widely spreading black **roots**. Roots may grow more than 8 feet deep. **Stems** are erect and openly branched on plants that grow 18 to 36 inches tall. Blue-green **leaves** on emerging plants are toothed and covered with fine hairs. Alternately arranged on the stem, the lower leaves are deeply lobed and 2 to 4 inches long, while the upper leaves are entire or serrate and narrowing to a stalkless (sessile) base. The **flower** heads are $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter and solitary at the tip of leafy branchlets. Pink flowers are common, but flower color may range from white to lavender. Many pearly bracts with rounded or acute, papery margins cover the base of the flower (involucre). Flowers occurs from June through frost. **Seeds** (achenes) are $\frac{1}{8}$ to $\frac{1}{4}$ inch long and have many white bristles.

Habitat Preferences: Russian knapweed colonizes cultivated fields, orchards, pastures, roadsides, and rangelands. It does not establish readily in most healthy, natural environments, but if it becomes established in a disturbed area it will encroach into a nearby healthy plant community. This plant may easily dominate cultivated fields and rangelands in Nevada where the water table is 20 feet or less under the soil surface.

Management: Cultivation and moving infested soils and contaminated equipment spreads this weed. Temporary management of Russian knapweed can be achieved with herbicides applied in late fall, but long-term reductions must include planting competitive plant species. Likewise, the correct application of herbicides to control this weed before establishing perennial grasses is important. The biological control organisms introduced to control Russian knapweed have not proven effective.

Yellow starthistle

Asteraceae

Centaurea solstitialis L.

Mature yellow starthistle plant.



Seedling plant
leaves have deeply
lobed margins with
pointed tips (left).

Yellow flowers
with $\frac{3}{4}$ -inch long
spines (right).



Centaurea solstitialis L.

Origin: Europe

Description: Mature plants grow 12 to 36 inches tall. Yellow starthistle seedlings have oblong, tongue-shaped seed **leaves** (cotyledons). There are 3 types of true leaves. Basal leaves are 2 to 3 inches long and deeply lobed. Lower stem leaves are narrow with blades that extend down the stem forming wings. The upper leaves are short, $\frac{1}{2}$ to 1 inch long, narrow, and sharply pointed. A cottony pubescence gives them a white to gray-green color. The rigid **stems** are spreading, branched from the base, and covered with white to gray, loose, cottony hairs. The 1-inch wide dandelion-like, bright yellow **flowers** occur singly at the ends of the branches from May through December. They produce long, sharp, rigid, unbranched, $\frac{3}{4}$ -inch, straw-colored spines at their base. The lowest spines are 3-parted. This plant spreads by **seeds** that are either light-colored with bristles or dark to black without bristles.

Habitat Preferences: Yellow starthistle infests cultivated fields, pastures, waste lands, roadsides, and rangelands in the west. Outbreaks are occurring in Nevada and may dominate rangelands with annual precipitation of less than 15 inches.

Management: Infested rangeland is avoided by grazing animals. Horses forced to eat yellow starthistle may die from "chewing disease." Cattle and sheep may graze yellow starthistle early; after flowering, only goats will eat it. Hand pulling is effective in small areas when the entire root is removed. Mowing is expensive and can result in prostrate plants that continue to flower. Burning is effective in combination with chemical treatments and revegetation with a perennial grass. Various herbicides are available for control. Release of several insects and a disease have been marginally effective and are still being investigated. Timing of control methods is critical to success.

Squarrose knapweed

Asteraceae

Centaurea virgata Lam. var. *squarrosa* (Willd.) Boiss.

Mature squarrose knapweed plant.



Flower head showing recurved bract tips (left).



Seedling showing deeply indented gray-green leaves (right).

Centaurea virgata Lam. var. *squarrosa* (Willd.) Boiss.

Origin: Eastern Mediterranean

Description: Squarrose knapweed is a long-lived perennial that grows 12 to 36 inches tall. It grows a **taproot**. The branched **stems** have deeply dissected, alternate lower **leaves** and bract-like upper leaves. **Flower** clusters occur from June to August and are small with 4 to 8 rose- or pink-colored flowers, each less than $\frac{1}{2}$ inch long. The flowers have an urn-shaped base covered with bracts and usually develop no more than 3 to 4, $\frac{1}{8}$ -inch long, dull brown **seeds** with straw-colored lines and bristles about half as long as the seed. The bract tips are recurved or spreading and have terminal spines longer than the lateral spines on each bract. Squarrose knapweed is often confused with diffuse knapweed, but it is a true perennial, its bracts are recurved, its seed heads fall off the stems soon after the seeds mature, and its seed has hairs (pappus), while diffuse knapweed seed is hairless.

Habitat Preferences: Squarrose knapweed is not common, but is found in dry rangelands of California, Oregon, and Utah. Seeds are easily spread by livestock and wildlife. Once established, squarrose knapweed is difficult to control. It will take vigilance to keep it from becoming established in Nevada, particularly in drier rangelands.

Management: Small infestations may be eradicated by grubbing or digging the roots with a shovel. Hand pulling is ineffective. Use tillage in pastures and fields. Herbicides are registered for control of knapweeds on rangeland. Most are effective when sufficient precipitation carries them into the soil. Grazing is not recommended as seeds stick to animal coats or get lodged in hooves. There are 6 insects introduced for biological control. Large rangeland infestations should use a combination of herbicides, revegetation with perennial forage species, and improved grazing management. Prescribed fire may be effective in conjunction with herbicide treatments and revegetation.

Mature rush skeletonweed plant.



Rosettes have red hairs when stem elongation starts in early summer (left).



Strap-shaped, yellow petals have a flat end with distinct lobes (right).

Chondrilla juncea L.

Origin: Eurasia

Description: A perennial, rush skeletonweed grows 12 to 48 inches tall and has a deep, extensive **root** system. Its **stems** have coarse, red hairs that bend downward 4 to 6 inches up their base. The stem is hairless and smooth above. Sharply-toothed **leaves** form a dandelion-like rosette that withers as the flower stem develops. Leaves up the stem are inconspicuous, narrow, and entire. The green stems photosynthesize. The plant exudes a milky latex when cut or damaged. The **flowers** are scattered on the branches, are approximately $\frac{3}{4}$ inch in diameter, and have 7 to 15 yellow, strap-shaped petals. Flowers and the pale brown to nearly black, $\frac{1}{8}$ -inch long **seeds** are produced mid-July through frost. The seeds are ribbed with tiny, scaly projections on top and a long beak with soft, white bristles at one end.

Habitat Preferences: It inhabits well-drained, light-textured soils along roadsides and in rangelands, grain fields, and pastures. This plant prospers in disturbed soils and with 9 to 59 inches of annual precipitation. It is growing in Elko and Douglas counties in Nevada and infests millions of acres in Idaho, Oregon, Washington, Montana, and California.

Management: Hand pulling and grubbing are effective in small, young infestations, but new plants will emerge from severed roots and buried seeds. Mowing and cultivation are ineffective; they increase the infestation. Planting competitive legumes can reduce populations of rush skeletonweed. Early, repeated grazing by sheep can reduce or prevent production of rosettes and seed. Herbicides are ineffective due to a lack of leaf surface; use surfactants to improve uptake of the chemical into the stems. Three biological control agents are available that reduce its competitiveness with other vegetation.

Mature Canada thistle plant.



Clusters of purple flower heads have spineless bracts (left).

Rosettes with spiny-tipped, wavy leaves appear in early spring (right).



Cirsium arvense (L.) Scop.

Origin: Southeastern Eurasia

Description: Canada thistle is a colony-forming perennial with deep and extensive horizontal **roots**. Its **stems** are 12 to 48 inches tall, ridged, and branched above. Its alternate, oblong or lance-shaped **leaves** lack petioles, are sessile, and are divided into spiny-tipped, irregular lobes. Pink or purple **flowers** are borne in heads $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter and can be male or female borne on separate plants (dioecious). The involucral bracts at the base of the flower are spineless. Canada thistle **fruits** are about $\frac{1}{8}$ inch long, somewhat flattened, and brownish, with a tuft of hair at the top. It reproduces through **seed** dispersal as well as by vegetative spread from horizontal creeping roots. Flowering occurs in July and August.

Habitat Preferences: Canada thistle has a wide habitat range and is fairly adaptable. It is usually found in open areas with moderate or medium soil moisture, and favors clay soils. It is mostly found along roadsides and railroad rights-of-way, and on rangeland, forest land, lawns, gardens, cropland, and abandoned fields. Canada thistle grows best in places with annual precipitation of 16 to 30 inches.

Management: Hand pulling and burning are ineffective due to Canada thistle's extensive root system. Both cause rapid resprouting from the roots. Frequent cultivation can be effective if all shoots are eliminated every time. Mowing repeatedly is effective in alfalfa and other forage crops. Its spiny leaves make Canada thistle inedible. There are several biological control agents registered for this plant. Single herbicide applications will not provide long-term control. Applying herbicides at the proper rate and time is important and, as with most invasive weeds, requires follow-up management for several years.

Mature common crupina plant.



Seedling showing the fleshy, oblong cotyledons (left).

Mature flower heads with purple flowers (right).



Crupina vulgaris Cass.

Origin: Mediterranean

Description: Common crupina is a fall-germinating annual. Its fleshy seed **leaves** (cotyledons) have a red or purple midrib. The rosette leaves are obovate with entire to slightly toothed margins. Older rosette leaves and stem leaves are pinnately to bipinnately lobed with margins armed with short, stiff spines. The alternate, stemless leaves become progressively smaller toward the tip of the **stems** that grow 12 to 36 inches tall. The stems end in 1 to several short flowering branches; additional flowering branches grow out of the upper leaf axils. One to 5 **flowers** are produced on each branch in June and July. The flower heads have a narrow, cylindrical base (3 to 4 times longer than wide), and are topped with pink, lavender, or purple flowers. Each **seed** is encircled with a distinct ring of dark, stiff bristles near its broad end. It looks like a dry fly used in fishing. Seeds germinate under a variety of temperatures and remain viable for up to 3 years. They are spread by wind, water, and wildlife.

Habitat Preferences: Common crupina is adapted to a variety of conditions, but prefers well-drained, sandy or loamy soil. It commonly infests southern slopes of steep canyon grasslands in the Pacific Northwest, western rangelands, and disturbed non-crop lands. Common crupina grows where precipitation ranges from 15 to 30 inches per year and the mean annual temperature is between 46° and 54° F.

Management: Common crupina is unpalatable to livestock, so grazing is not beneficial. Because its bristly seed can stick to their coats, livestock may aid its spread. Repeated hand pulling, hoeing, or other tillage is effective on small infestations when done before the plant flowers. However, mowing is not recommended. Maintaining healthy, competitive grasses is the best deterrent to invasion by this weed. Herbicides are available and effective when used correctly.

Scotch thistle

Asteraceae

Onopordum acanthium L.

Mature scotch thistle plant.



Flowers are violet to reddish and the stems are winged (right).



Rosette leaves are covered with white hair, giving them a grayish green color (left).

Onopordum acanthium L.

Origin: Europe and western Asia

Description: Scotch thistle, a robust biennial or short-lived perennial, may grow 10 to 12 feet tall in moist, fertile soil, but is short and slender in dry, infertile areas. The thick seed **leaves** (cotyledons) are twice as long as they are broad, with a shallow cup at their base. The first true leaves are 3 to 4 times longer than broad and their base clasps the **crown**. Unequally long hairs form at the base of the plant. Short, stiff hairs cover the upper surface of stalkless leaves, while underneath they have prominent veins and margins. Cottony hairs cover the developing bud, but later disappear. Branches on the central **stem** grow upright, are covered with grayish hairs, and produce wings that may be up to 2 inches broad and have many stiff horizontal spines. The **leaves** are oblanceolate, up to 12 inches long and 4 inches broad. The margins are lobed with sharp spines. The upper surface of the leaves is green; the underside grayish. Small, lance-shaped leaves on the upper part of the stems are often more narrow than the wings on the stem. The **flower** heads are 1 to 2 inches in diameter and borne singly at the tips of branches from June through September. The bracts are lance-shaped; the lower ones appressed, the upper ones erect or spreading, tapering to a rigid spine. The flowers are violet to reddish. The one-seeded **fruit** is $\frac{1}{5}$ to $\frac{1}{4}$ inch long, flattened, wrinkled, hairy, brownish gray to black, and tipped with short bristles.

Habitat Preferences: Scotch thistle inhabits waste areas, roadsides, and disturbed soils. It is often distributed wide and sparse, but may form impenetrable stands.

Management: Removing plants by hand in small areas is effective. Repeated mowing before flowering lessens seed production. Maintain healthy, competitive vegetation to prevent establishment. Herbicides are available and should be applied in the rosette stage in early spring or fall.

Houndstongue

Boraginaceae

Cynoglossum officinale L.

Mature houndstongue plant.



In the second year, flowers produce an abundant supply of seeds (left).

Rosettes form the first year of the two-year growth cycle (right).



Cynoglossum officinale L.

Origin: Europe and Asia

Description: A biennial herb, houndstongue grows as a rosette during the first year and produces an extensive **root** system. The second year, it grows a stalk, flowers in May through July, and produces seed in late summer. The roundish, light green seed **leaves** (cotyledons) are $1\frac{1}{4}$ times as long as they are broad. They are hairless, nearly stalkless, and produce a shallow notch at their tip. The leaves from the **crown** have an elongated oval shape with a lobe at their base. They grow on a long stalk covered with short hairs. The mature plant is covered with soft, matted hairs. Its **stems** are stout, 16 to 24 inches tall, and produce alternate, entire leaves from the base to the top. The lower leaves are 6 to 12 inches long, $\frac{4}{5}$ to $2\frac{3}{4}$ inches wide, and oblong to lance-shaped with slender stalks. The upper leaves are lance-shaped, pointed at the tip, and stalkless; the uppermost clasp the stem. Reddish purple **flowers** grow from mid-June through August on numerous, simple or branched stalks. The **seed** is a deeply four-lobed, prickly nutlet borne on a pyramid-shaped receptacle. Seeds cling to passing animals and are easily scattered across the landscape. The prickly burrs may cause open wounds on animals.

Habitat Preferences: Widely distributed, houndstongue is found in irrigated and dryland pastures, fence rows, roadsides, and waste areas. It grows on a variety of soils from well-drained, relatively coarse, alkaline soils to clay subsoil.

Management: Digging, pulling, and cutting are ineffective because of the extensive root system, but can be performed on small infestations if the entire plant is removed. Clipping and mowing close to the ground during flowering can greatly reduce seed production. Herbicides are available for houndstongue control, but repeated applications are required. There are no biological control agents for houndstongue.

Hoary cress

Brassicaceae

Cardaria draba (L.) Desv.

Mature hoary cress plant.



This perennial starts growth very early in the spring (right).



Small, white flowers with four petals develop bladder-like seed capsules in midsummer (left).

Cardaria draba (L.) Desv.

Origin: Europe

Description: Hoary cress, or heart-podded whitetop, is a deep-rooted perennial that grows up to 24 inches tall. The **leaves** are 1 to 1½ inches long, blue-green, waxy, and lance-shaped. The lower leaves are stalked, while the upper leaves are stalkless and have two lobes that clasp the stem. Clusters of white **flowers**, each with four petals, give the plant a flat-topped appearance. Flowering occurs in spring and **seeds** are set by midsummer. The heart-shaped seed capsules contain two reddish brown seeds separated by a narrow, papery partition. Hoary cress may grow from seed and also from **root** segments if the soil is tilled. Two other species, lens-podded whitetop (*C. chalepensis* L.) and globe-podded whitetop [*C. pubescens* (C.A. Meg) Jarmolenko] are common in the western United States. Differences in seed capsules are used to distinguish the species.

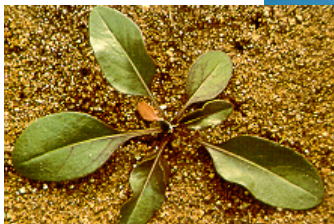
Habitat Preferences: Cardarias commonly grow on disturbed sites with alkaline soils. Sites susceptible to invasion include sub-irrigated pastures, rangeland, ditch banks, roadsides, and waste areas. They are highly competitive with other species once established.

Management: Diligent digging can provide control of very small infestations, but requires that the entire plant be removed, including the spreading roots. Both seed and root pieces may be carried by equipment to infest new sites. Mowing reduces seed production and can be effective when combined with herbicides. Flooding can control the plant, but is of limited use in dry Nevada. Sheep will graze hoary cress. There are no biological controls available. Herbicides may be effective, but require persistent application over several years.

Mature dyer's woad plant.



Near midsummer, purplish brown seed pods containing a single seed appear (right).



In fall, seedling plants begin growing and then overwinter (left).

Isatis tinctoria L.**Origin:** Europe

Description: Dyer's woad, a winter annual, may flower in late April and June. It produces **seed** in June or early July in northern Nevada. The seed **leaves** (cotyledons) are light green, oval-shaped, and $\frac{1}{2}$ to $\frac{1}{4}$ times as long as they are broad with short stalks $\frac{1}{8}$ to $\frac{1}{4}$ inch long. The first true leaf is broad at the top, tapers gradually to a short stalk, has a prominent midvein, and is smooth around the margin. The plant grows 12 to 48 inches tall with erect branches from its base. The lower lateral branches may lie close to the ground but rise at their ends (decumbent). Dyer's woad has a long, thick **taproot** that produces a new plant if cut. The alternate **leaves** are bluish green, whitened with a bloom (glaucous), and hairless except along the midrib of the lower leaves. The lower leaves are oblong and lance-shaped with coarsely toothed blades that narrow to a stalk nearly as long as the leaf blade, for a total length of 2 to 4 inches. The upper leaves are smaller, narrower, and stalkless, and clasp the stem with ear-like projections (auricles). The yellow **flowers** are tiny, $\frac{1}{8}$ inch long, and are crowded into flat-topped clusters (corymbose). The outer flower stalks are longer than the inner ones. A single, yellowish **seed**, $\frac{1}{8}$ to $\frac{1}{7}$ inch long, is produced in a purplish brown, narrow, $\frac{1}{2}$ -inch long pod.

Habitat Preferences: This plant will establish in rocky soils with minimal water-holding capacity. It infests rangelands, grain fields, pastures, waste areas, and grows along roadsides and fence rows. It is often a problem in cultivated row crops and orchards.

Management: Hand pulling of individual weeds is effective. Tilling or cultivating mature plants is not recommended, unless done frequently. Herbicide application and biological control with a rust disease are also effective.

Perennial pepperweed

Brassicaceae

Lepidium latifolium L.

Mature perennial pepperweed plant.



Leaves and stems are covered with a waxy layer (left).



Dense flower clusters appear in early summer (right).

Lepidium latifolium L.

Origin: Southern Europe and western Asia

Description: Perennial pepperweed, or tall whitetop, has naturalized in parts of the United States and Canada. This plant commonly grows 24 to 36 inches tall, and sometimes up to 84 inches tall. The lanceolate **leaves** are bright green to gray-green and have a smooth (entire) to toothed margin. The lower leaves are larger than the upper leaves. White **flowers** develop in dense clusters on the ends of branches. Individual flowers are very small, but the entire top of the plant blooms in early summer (June) through fall. A two-seeded **fruit** capsule produces reddish brown **seeds** that are round, flat, slightly hairy, and about $\frac{1}{16}$ inch long. Perennial pepperweed spreads rapidly by creeping **roots** to form a dense monoculture that blocks sunlight from the soil and suppresses the growth of other plants.

Habitat Preferences: Perennial pepperweed grows in riparian sites. It may occupy wet areas, ditches, waste places, cropland, rangeland, roadsides, and even dry desert plant communities. It is very difficult to control once established, especially near water.

Management: The robust, spreading roots and numerous seeds make this weed difficult to control. Mechanical controls are not recommended; digging, mowing, and tilling encourage new plants to develop from severed roots. There are no insect or disease agents available. However, intense, frequent grazing by sheep that removes the plant to the ground and does not let it get more than 6 inches tall all season is effective. Grazing by sheep must be followed up with chemical spot treatments over several years to eradicate this weed. Chemical applications must be timed properly. Integrated weed management is best; no one tool or approach used alone is successful.

Austrian fieldcress plant.



Austrian fieldcress roots (right).



Loose clusters of yellow Austrian fieldcress flowers (left).

Rorippa austriaca (Crantz) Bess.

Origin: Eastern Europe

Description: Austrian fieldcress is a perennial that primarily reproduces by **rhizomes** and occasionally by seed. Its smooth **stems** are erect and branched at the top. It grows 12 to 36 inches tall. The **leaves** are alternate. The upper leaves clasp the stem and the larger, lowermost leaves have petioles and are distinctly toothed. The **flowers** are borne in loose clusters at the tips of branches from June through August. Each flower has 4 small, yellow petals. Its small **seed** pods are nearly spherical or oblong with a distinct beak at the tip. Its small, brown to black, rough or warty seeds do not usually develop in northern regions and are rarely a source of reproduction or plant spread.

Habitat Preferences: Austrian fieldcress is found in disturbed and cultivated sites, roadsides, fields, and mud flats. It typically inhabits areas where the soil is wet 6 to 8 months of the year. A University of Nevada, Reno herbarium record shows that it is in Elko County, Nevada.

Management: Rotating to a cropping system that uses less water and allows for intense cultivation and use of herbicides is likely the most effective way to control Austrian fieldcress.

St. Johnswort

Clusiaceae

Hypericum perforatum L.

Mature St. Johnswort plant.



Yellow flowers appear in early summer with 5 petals and many showy stamens (right).



The oval-shaped leaves have prominent veins and tiny transparent dots, visible when back lit (left).

Hypericum perforatum L.

Origin: Europe

Description: St. Johnswort, or Klamath weed, is a perennial that flowers and fruits from June through frost. The seed **leaves** (cotyledons) are $1\frac{1}{2}$ times as long as they are broad, with 3 veins meeting in an imbedded gland at the tip. The first pair of true leaves are papery-thin with fine granules on their surface. Seedling leaves have prominent, clear dots with about 5 elevated black glands along the underside of the leaf margin. Mature plants are 12 to 36 inches tall with woody-based **stems** that branch on their upper halves. The **root** system is fibrous. Creeping horizontal stems root at the nodes when they touch the ground. The mature **leaves** are light green, stalkless, oblong or long, and narrow with an entire margin that rolls backward (revolutes). The veins are prominent underneath and small, transparent dots cover the $\frac{3}{5}$ to 1 inch long and

$\frac{1}{12}$ to $\frac{1}{6}$ inch wide leaves. Short, leafy branches are borne in the leaf axils. The dense, flat-topped **flower** cluster (cyme) is bright yellow. The lance-shaped sepal is $\frac{1}{6}$ to $\frac{1}{5}$ inch long and gradually tapers to a short point. The $\frac{3}{5}$ to 1 inch wide flower that may have black dots on the edge of the 5 petals, has numerous showy stamens. The **seeds** are borne in an oval-shaped, 3-celled capsule, $\frac{1}{6}$ to $\frac{1}{4}$ inch long, that breaks apart at maturity. The shiny, dark brown or black seeds are produced in large quantities. They are $\frac{1}{40}$ to $\frac{1}{35}$ inch long and are net-veined (reticulate).

Habitat Preferences: St. Johnswort prefers dry, sandy, or gravelly soils and often occurs in pastures, open woods, waste places, and along roadsides.

Management: Poisonous to livestock and difficult to eradicate, St. Johnswort is controlled partially by the Klamath weed beetle (*Chrysolina quadrigenina*). Selected herbicides may control St. Johnswort if applied correctly.

Leafy spurge

Euphorbiaceae

Euphorbia esula L.

Mature leafy spurge plant.



Heart-shaped, yellow bracts surround the 3-celled seed capsule (left).



Pink shoot buds grow on the crown and roots of leafy spurge (right).

Euphorbia esula L.

Origin: Eurasia

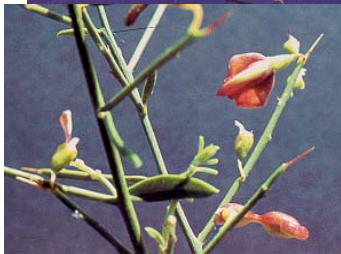
Description: This perennial grows up to 36 inches tall with long, ascending, thickly clustered stalks. The **crown** and **roots** are brown with numerous pink buds that may produce new shoots. The extensive deep roots contain large nutrient reserves that make leafy spurge control extremely difficult. The alternate **leaves** are narrow and 1 to 4 inches long. Those below the flowers are broadly egg-shaped and small. The **flowers** are yellowish green, $\frac{1}{8}$ inch long, and arranged in clusters on the ends of stalks. A pair of heart-shaped, yellow-green bracts grow immediately below the flowers. Flowering occurs from June through September. Leafy spurge produces 1 oblong, grayish to purple **seed** in each cell of a 3-celled capsule. Capsules explode upon drying, projecting seeds up to 15 feet away. The seeds are viable in the soil at least 8 years. The entire plant contains a milky sap that may irritate the skin and eyes.

Habitat Preferences: Leafy spurge infests almost 2.5 million acres in North America, mostly in southern Canada and the north-central United States. It is primarily found in pastures, range-lands, roadsides, waste areas, abandoned cropland, and increasingly in areas disturbed by development. Leafy spurge displaces many species and is very difficult to control once established.

Management: Leafy spurge spreads by seeds or vegetative buds on root pieces brought into uninfested areas; keep it out. It causes severe mouth, throat, and digestive tract irritation and may result in death of cattle. Sheep and goats safely eat it and can be managed so they prefer it to other plants, which reduces seed production. Other biological control agents may also reduce its stand. Fall cultivation can be helpful, but mowing, burning, and pulling are ineffective. Herbicides are available to help control leafy spurge.

Alhagi pseudalhagi (Bieb.) Desv.

Mature camelthorn plant.



Pea-like flowers are pinkish purple to maroon and $\frac{3}{8}$ inch long (left).

Spines along the stems have yellow tips (right).



Alhagi pseudalhagi (Bieb.) Desv.

Origin: Asia

Description: Camelthorn is a perennial shrub that grows 18 to 48 inches tall. It is spiny and intricately branched. Greenish **stems** are ridged (striate) and hairless (glabrous), with slender spines $\frac{1}{4}$ to $1\frac{3}{4}$ inches long. The wedge-shaped **leaves** are alternate with hairs only on the underside. They are $\frac{1}{4}$ to $1\frac{1}{4}$ inches long and $\frac{1}{8}$ to $\frac{1}{2}$ inch wide. Small, pea-like **flowers** are pinkish to maroon and occur on short, spine-tipped branches along the upper portion of the plant in June and July. The reddish brown jointed **seed** pods are curved upwards and deeply indented, with each seed being clearly outlined in the pod. Camelthorn reproduces primarily from deep **roots** and shallow rhizomes, and also by seed.

Habitat Preferences: Camelthorn grows well on dry or moist sites and spreads rapidly along streams and canals. It is also adapted to a wide range of soil pH; consequently, it has great potential to infest much of the Great Basin. It is presently growing in localized sites in Clark County.

Management: The extensive root system makes control of camelthorn difficult. Tillage is ineffective and may increase the size of the invasion. There are no registered biocontrols, but herbicides are available.

Eurasian watermilfoil infestation.



This aquatic plant invades slow-moving bodies of water (right).



Mature Eurasian watermilfoil plant (left).



Myriophyllum spicatum L.

Origin: Eurasia, northern Africa

Description: Eurasian watermilfoil is a submersed, perennial herb. It produces an extensive, shallow **root** system in the sediments of watercourses that is capable of generating new shoots. It grows stems and branches that are 1 to 20 feet long. Most however, are 6 to 8 feet long. The branched **stems** produce four **leaves** at each node, but are leafless near their base. The nearer the stem grows to the surface of the water, the shorter the internodes are and more branching and leaf development occurs. Thus, impenetrable mats of stems and leaves form below the water's surface with a heavy infestation. The stem tips are tassel-like and reddish, especially early in the season. The feather-like, pinnate leaves have 14 or more pairs of leaflets and are 1 inch long. White to light pinkish **flowers** are borne by midseason in whorls on spikes above the water. The flower stalk may bend parallel to the water's surface. Eurasian watermilfoil does not form turions, but reproduces by **seed** and vegetatively from buds, stem fragments, rhizomes, and the root crown as the stem dies back each season.

Habitat Preferences: It inhabits lakes, reservoirs, ponds, streams, and ditches where standing or slow moving water occurs.

Management: Exclusion and boat, vehicle, and equipment cleaning and inspection prevent its introduction. Increasing water flow and wave action prevents its establishment. Mechanical removal and mowing of the stem spreads this weed. However, physical removal of the root system is effective. Sterile grass carp eat Eurasian watermilfoil, but other biocontrols are not readily available. Herbicides are available.

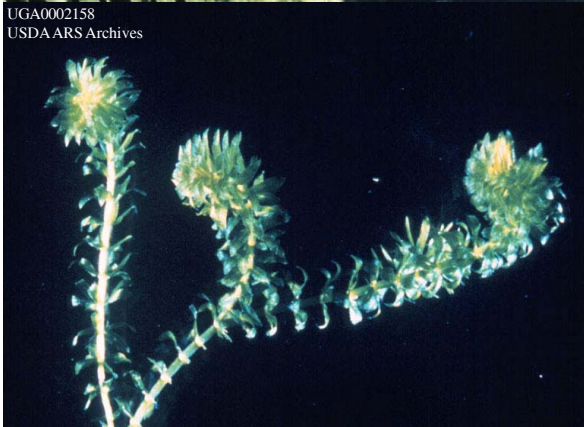
Hydrilla verticillata (L.F.) Royle

Hydrilla plants.

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USDA APHIS - Oxford, North Carolina Archives



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USDA ARS Archives



CDFA/IPC



CDFA
R.J. Helton

Hydrilla infests and clogs waterways (above). It has pointed leaves borne in whorls along each stem (left).

Hydrilla verticillata (L.F.) Royle

Origin: Asia, Africa, Australia

Description: Hydrilla is a submersed, perennial, aquatic herb. Its small **leaves** are pointed and arranged in whorls of 4 to 8 along long stems. They have serrated margins and 1 or more sharp teeth under the midrib. The plant can either be dioecious (female and male flowers on separate plants) or monoecious (female and male flowers on the same plant). Hydrilla often produces a mat of **stems** that creep above and below sediment of the water body and develops subterranean turions at their tips (tubers). Turions are whitish to brown-black, plump, ovoid tubers (potato-like structures). Its **flowers** extend to the surface of the water on a long, thread-like flower tube. The sepals and petals are translucent and white to reddish. Flowers occur from June through October. The **fruits** are smooth and narrowly cylindrical. The smooth, brown **seeds** are not released from the fruits. Hydrilla reproduces by stolons (stems that grow along and above the sediment of the water body), stem fragments, stem turions, subterranean turions, and seeds.

Habitat Preferences: Hydrilla inhabits water 1½ to 10 feet deep and grows at water temperatures of 50° to 95° F. It tolerates low light and variable water quality, and its turions survive temperatures near freezing. Hydrilla can be found in freshwater lakes, ponds, rivers, impoundments, canals, and ditches.

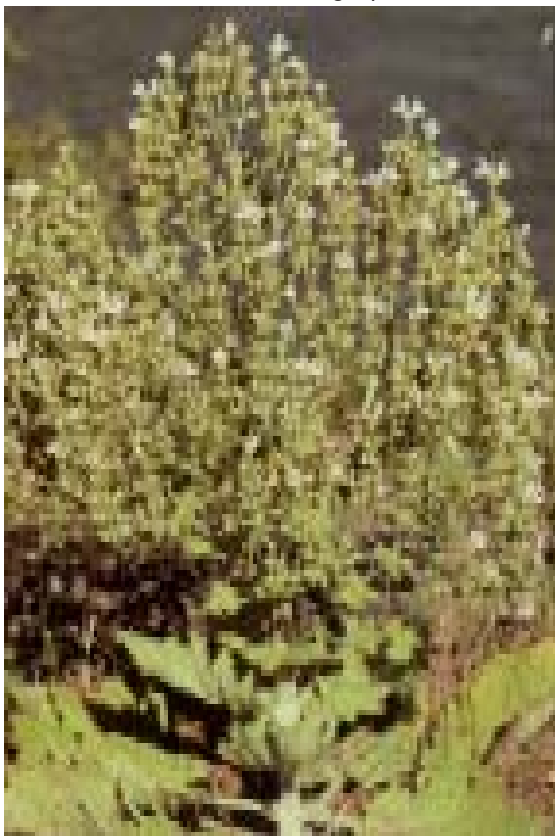
Management: Aquatic herbicides are available for control of hydrilla, but they do not affect seeds or turions, thus repeated applications are necessary. Control over small infestations can be achieved by using an opaque fabric to block sunlight from the plants. Mechanical controls are not recommended because hydrilla spreads easily by fragmentation. Grass carp effectively control hydrilla.

Mediterranean sage

Lamiaceae

Salvia aethiopis L.

Mediterranean sage plant.



In the first season of growth, a rosette with felt-like leaves appears (left).

The 2-lipped flowers are yellowish white and borne in clusters (right).



Salvia aethiopis L.

Origin: Mediterranean, northern Africa

Description: Mediterranean sage is an aromatic biennial that grows 24 to 36 inches tall from a stout **taproot**. It appears as a large, grayish rosette in the first season, and then matures into a multi-branched plant during the second season. The white to blue-green **leaves** are woolly and felt-like. The large lower leaves have petioles and are lobed with coarsely-toothed blades 4 to 12 inches long. The smaller, upper leaves clasp the stem. In time, the leaves may lose their felt-like covering from the upper surface, exposing a green, wrinkled surface. Yellowish white, two-lipped **flowers** are borne in clusters of 4 to 6 on branched stems in June and July. Four smooth **nutlets** with dark veins develop from each flower. Mature plants break off and become tumbleweeds, easily spreading the **seeds**.

Habitat Preferences: Mediterranean sage invades pastures, meadows, rangeland, and other open areas. It grows on moderate to deep soils with good drainage, and is well-adapted to warm, dry desert environments.

Management: Small infestations may be controlled by digging. Cutting the taproot 2 to 3 inches below the crown when the plants are beginning to bolt prevents most resprouting. Frequent mowing during the growing season can prevent or reduce seed production, but plants will regrow and continue flowering. Mowing too late in the season, after the seed is produced, distributes the seed. Mediterranean sage is unpalatable and livestock will usually avoid it. The root-feeding weevil *Phrydiuchus tau* has successfully reduced the density of Mediterranean sage in some states when combined with competitive vegetation and well managed grazing. Herbicides are available and are most effective when applied with a surfactant in the rosette stage of the plant.

Purple loosestrife

Lythraceae

Lythrum salicaria L.

Mature purple loosestrife plant.



Opposite or whorled, lance-shaped leaves have smooth margins (right).



Showy rose-purple flowers bloom in long vertical clusters (left).

Lythrum salicaria L.

Origin: Europe

Description: This introduced European ornamental is a rhizomatous perennial that grows erect **stems**, often 72 to 96 inches tall. The stems are stout and square or sharply angled, not round. The **leaves** are simple, entire, and they grow opposite each other or are whorled along the stem. These lance-shaped leaves have smooth (entire) margins and are stemless. Rose-purple **flowers** have 5 to 7 petals and are arranged in long, vertical racemes (linear clusters) at the end of the stems. They are very showy midsummer to fall. The small **seeds**, less than $\frac{1}{16}$ inch, are dark. This is an aggressive weed in moist sites because of its stout **roots** and its ability to spread and propagate from seed and rhizomes.

Habitat Preferences: Purple loosestrife readily infests aquatic sites—streambanks, shorelines of shallow ponds, reservoirs, canals, and ditches. It impedes water flow and greatly reduces habitat for wildlife. It usually occupies moist or marshy sites, but once established tolerates intermittently dry soils.

Management: Many states besides Nevada have declared purple loosestrife a noxious weed. The Nevada Department of Agriculture has required nurseries stop selling purple loosestrife and its cultivars as ornamentals. Eradication of purple loosestrife may be possible in small infestations. Several herbicides are available for chemical control. It is difficult to get all of the roots and stems when removing the plant by hand, but this method can be used for small infestations. Cutting and mowing can spread the plant and are ineffective. Burning is difficult and favors loosestrife over native plants. Burning purple loosestrife is not recommended. Flooding may enhance its spread and should not be used. There are several biological control species available to contain purple loosestrife.

Green fountain grass

Poaceae

Pennisetum setaceum (Forsk.)

Fountain grass flower, purple cultivar.

CDFA
J.R. Manhart



CDFA
Alfred Brousseau



UCCE
Joe DiTomaso



Mature fountain grass plants may have green or purple seedheads.

CDFA
Alfred Brousseau



Pennisetum setaceum (Forsk.)

Origin: Africa

Description: Green fountain grass is a showy perennial. Its **blades** are rolled in the bud. They grow folded or flat, are smooth (glabrous) to sparsely short-hairy, and have pronounced midveins on their underside. The ligule consist of a fringe of white hair. It lacks auricles and its collar margins are hairy (ciliate) with white hair. Its **roots** are fibrous. Below each **spikelet** or small cluster of spikelets are long, flexible bristles. The green to purplish (associated with purple cultivars), lance-shaped spikelets consist of a lower glume-like sterile floret and an upper fertile floret. Its **seeds** are oblong to obovoid, yellowish brown, and smooth. Reproduction is by seeds dispersed by spikelets in late spring through summer.

Habitat Preferences: Fountain grass prefers disturbed sites, roadsides, undisturbed coastal dunes, coastal sage scrub, warm desert shrubland, and canyons. It is planted in urban landscapes. It grows best in areas with mild winters and some summer moisture. It tolerates periods of drought, light shade, and most soil types, but does not survive prolonged periods of freezing temperatures. It can grow in rock crevices and pavement cracks, but cannot tolerate saline conditions. It has great ability to adapt to an environment, which increases its ability to spread.

Management: It is most important to control seed production. Hand removal of small infestations can help prevent its spread. Mowing and grazing are not recommended as they increase stand density in the long run. Also, cattle do not prefer fountain grass and eat it only after they have depleted surrounding native species. Do not burn fountain grass because it is fire-adapted, growth is stimulated, and stands increase with fire. Nonselective herbicides are available to kill it. Both pre- and post-emergent products are recommended where seed has dispersed.

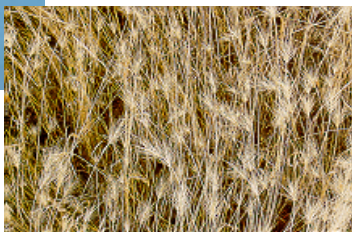
Taeniatherum caput-medusa (L.) Nevski

Mature medusahead plant.



Twisted awns or beards are a characteristic used to identify medusahead (left).

Medusahead crowds out all other vegetation on infested rangeland (right).



Taeniatherum caput-medusa (L.) Nevski

Origin: Eurasia

Description: This aggressive winter annual may grow 6 to 24 inches tall. The **leaf** blades are usually $\frac{1}{8}$ inch wide or less and rolled when cut in cross-section. The **inflorescence** is a long-awned spike that is nearly as wide as it is long. The mature **awns** are twisted, stiff and finely barbed, and range from 1 to 4 inches long. **Flowering** and **seed** formation occur in May and June. After the florets fall away, a bristly head of awn-like glumes persists, often over winter. Medusahead may be confused with foxtail barley and squirreltail. However, its spike does not break apart as the seeds mature, and it is an annual while they are perennial plants. Likewise, medusahead seedlings are similar to downy brome seedlings, except the latter is much hairier.

Habitat Preferences: Medusahead infests semi-arid rangeland and has invaded millions of acres in the Pacific Northwest, northern California, and is now spreading across northern Nevada. It grows where the annual precipitation is 10 to 40 inches during fall, winter, and spring. Lack of summer precipitation favors medusahead. In the Great Basin, infestations primarily occur in former sagebrush-grass or bunchgrass communities that receive 10 to 20 inches of precipitation. It does best in clay soils that shrink, swell, and crack. It is extremely competitive, crowding out even such undesirable species as downy brome (approximately 9 million acres in Nevada).

Management: Control of small isolated infestations is critical to reducing the impact of medusahead on Great Basin rangelands. Spring plowing after most of the medusahead has germinated has given some control, and disking can be used as a follow-up. Combining mechanical efforts with burning or herbicides will provide better results. Revegetation and careful grazing management must follow any control effort to prevent medusahead from reestablishing dominance.

Mature sulfur cinquefoil plant.



Light yellow flowers have 5 deeply notched petals and yellow centers with many stamens (left).

Each compound leaf has from 5 to 7 toothed leaflets (right).



Potentilla recta L.

Origin: Europe

Description: Sulfur cinquefoil is easily confused with native *Potentilla* species and its identification should be confirmed by a plant specialist. It is an attractive perennial that grows 12 to 24 inches tall. It produces well-developed **rootstocks**. The **leaves** are palmately compound with 5 to 7 toothed leaflets radiating out from the leaf stalk. The leaves are green on their underside rather than silvery as in many *Potentilla* species. The leaves and **stems** are sparsely hairy. The light yellow **flowers** have 5 petals and each petal is notched at the end. The center is yellow and has numerous (30) upright stamens. Each flower produces numerous round **seeds** (achenes). Flowering occurs from May to July.

Habitat Preferences: Sulfur cinquefoil grows in disturbed areas and roadsides, as well as in rangeland when moisture is available. It is not a weed of cultivated crops. Colonies of plants may also infest undisturbed sites. It is not limited by soil texture.

Management: Control is very difficult. Hand digging can be effective in small infestations. Tilling, cultivation, and mowing are not effective. Selective herbicides are the most effective tool for controlling larger infestations. Sulfur cinquefoil is unpalatable to most livestock, and most grazing practices accelerate its dominance.

Giant salvinia plant.



UGA1317055
Scott Bauer



UGA0002106
Mic H. Julien

Giant salvinia hairs
form an eggbeater
shape (left).

Giant salvinia
leaves floating in
water (right).



UGA0001090
Scott Robinson

Salvinia molesta Mitch

Origin: Southeastern Brazil

Description: Giant salvinia is a floating, **rootless**, aquatic fern with horizontal **stems** that float just below the water's surface. A pair of green, floating or emergent, ovate to oblong **leaves** are produced at each node. They may be $\frac{1}{2}$ to $1\frac{1}{2}$ inches long. They are covered with tiny, white, water-resistant hairs on the upper surface. The stalks of each hair is divided into 4 thin branches that rejoin at the tips to form a cage that resembles a tiny eggbeater. The cage-like hairs may be damaged on mature leaves, but should be noticeable on young leaves. Giant salvinia also has a highly-divided third leaf that is brown and dangles underwater. It is often mistaken for a root. Giant salvinia grows rapidly to form thick mats with more vertically than horizontally aligned leaves. This plant's egg-shaped, slender, pointed **sporocarps** are used to distinguish it from related species. These sporocarps develop in elongated chains among the submersed leaves. Giant salvinia reproduces very effectively through vegetative means.

Habitat Preferences: Giant salvinia infests freshwater lakes, ponds, oxbows, ditches, slow-flowing streams and rivers, marshes, and rice fields. It has great potential to foul irrigation systems. It can survive freezing temperatures, but not icy waters. It cannot live in brackish waters and dies when the salt level exceeds $\frac{1}{3}$ that of sea water, 34 ppt (parts per thousand).

Management: Mechanical methods can be used to remove small infestations of giant salvinia, but all fragments must be removed from the water and burned. The salvinia weevil and salvinia stem borer may be used for biological control, and are considered to be very successful. Herbicides are also available for chemical control.

Dalmatian toadflax

Scrophulariaceae

Linaria dalmatica (L.) Mill.

Mature dalmatian toadflax plant.



Yellow flowers with long spurs appear in mid-summer (left).



Early spring growth has waxy leaves with a blue-green color. Leaves individually grasp the stem (right).

Linaria dalmatica (L.) Mill.

Origin: Southeastern Europe

Description: Dalmatian toadflax is an aggressive perennial that grows up to 36 inches tall. It reproduces by seed and deep **roots**. The egg-shaped **leaves** are dense and grow alternately along the stem. They have a smooth edge (entire), are waxy, gray-green, and clasp the stem. The upper leaves are conspicuously broad-based. Showy **flowers** are borne in the axils of upper leaves and are 2-lipped, $\frac{3}{4}$ to $1\frac{1}{2}$ inches long. They have a long spur and are yellow with an orange, bearded throat. The **fruit** is a 2-celled capsule about $\frac{1}{4}$ inch long with many irregularly-angled black **seeds**. Flowering occurs from midsummer to early fall.

Habitat Preferences: Dalmatian toadflax primarily occurs on sandy or gravelly soils along roadsides, railroads, pastures, cultivated fields, and on rangelands and clearcuts. It can adapt its growth to fit a range of habitats, and is tolerant of low temperatures and coarse-textured soils. It is highly competitive in areas where summers tend to be dry.

Management: The extensive, deep root system combined with the waxy leaves that repel pesticides make this an extremely difficult plant to control. Hand pulling dalmatian toadflax can be effective for small infestations, particularly in sandy soils or when soils are moist. Hand removal must be repeated over several years in order to deplete the root system. Mowing is not recommended, but frequent cultivation will control toadflax. Spring grazing by cattle increases stands of toadflax, but grazing by sheep reduces the infestation size and limits seed production. There are several species of insects that have been used for biological control of dalmatian toadflax. Effectiveness of herbicides in controlling dalmatian toadflax is highly variable, partly due to its waxy leaves. Soil type affects the effectiveness of pre-emergent herbicides. Dalmatian and yellow toadflax hybridize. Unfortunately, herbicide effectiveness may be reduced in hybrids.

Yellow toadflax

Scrophulariaceae

Linaria vulgaris (L.) Mill.

Mature yellow toadflax plant.



Narrow leaves are pointed at both ends and individually connected to the central stem (left).



Snapdragon-like, yellow flowers have an orange throat and spur-like tail (right).

Linaria vulgaris (L.) Mill.**Origin:** Eurasia

Description: Yellow toadflax is a creeping perennial that grows 12 to 24 inches tall. It has several main **stems** with numerous **leaves** that are pale green, narrow, pointed at both ends, directly attached to the stem, and 2 1/2 or more inches long. The attractive yellow **flowers** are 1 inch long with a bearded, orange throat and a spur-like tail. Several form near the ends of the stalk from May through September. The **fruit** is round, 1/4 inch in diameter, 2-celled, and brown, with many seeds. The **seeds** are dark brown to black, 1/12 inch in diameter with a flattened, papery, circular wing. Yellow toadflax reproduces by seed and underground **roots**. Along with the seed produced, the extensive root system makes this plant difficult to control.

Habitat Preferences: Yellow toadflax is an aggressive invader of rangelands where it displaces desirable grasses. It is also found along roadsides, in waste places, and cultivated fields.

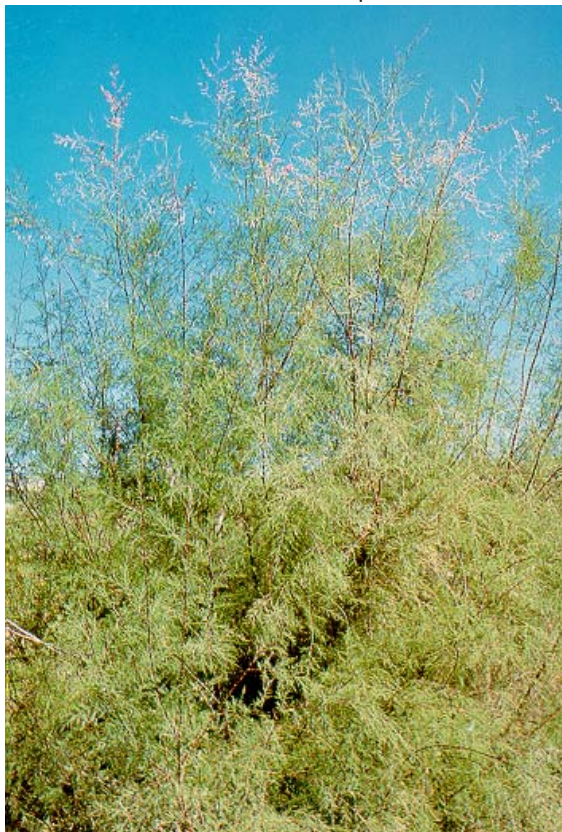
Management: Hand pulling yellow toadflax can be effective for small infestations, particularly in sandy soils or when soils are moist, but must be repeated over several years in order to deplete the root system. Mowing is not recommended, but frequent cultivation will control toadflax. Grazing cattle on yellow toadflax increases the infestation, but grazing by sheep reduces the stand size and limits seed production. There are several species of insects that biologically control yellow toadflax. Effectiveness of herbicides is highly variable due to its high genetic variability and herbicide resistance. Soil type is important when applying pre-emergent herbicides to contain or control yellow toadflax. Hybrids between dalmatian and yellow toadflax demonstrate less response to herbicides.

Saltcedar

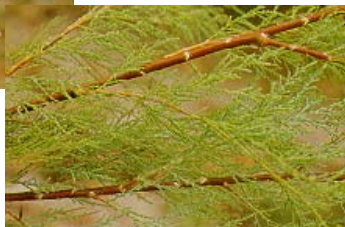
Tamaricaceae

Tamarix ramosissima Ledeb. & *Tamarix* spp.

Mature saltcedar plant.



Flowers are pink, small, 5-petaled, and borne in finger-like clusters (left).



Smooth woody stems are dark brown to reddish brown (right).

Tamarix ramosissima Ledeb. & *Tamarix* spp.

Origin: Turkey, Iran, central Asia, China, Mongolia

Description: This deciduous shrub and small tree grows 5 to 20 feet tall. **Bark** on saplings and young branches is reddish brown, turning gray, and becoming fissured with age. The pale blue-green **leaves** are small and scale-like, have a smooth (entire) edge, and are borne alternately on highly branched, slender stems. **Flowers** are pink to white, may occur in spring through late summer, and usually have 5 petals. Smallflower tamarisk (*T. parviflora* DC.) is similar in appearance, but has 4-petalled flowers with brown to deep purple bark on the stems. Smallflower tamarisk was introduced from southern Europe and is also widespread. Several other species of tamarisk have naturalized across the United States as well.

Habitat Preferences: Saltcedar has infested the desert southwest, mostly along waterways and in arroyos with ephemeral flows, interrupting natural habitats. It is well adapted to alkaline and salty soils, heat and cold, and windy sites. Its aggressive, deep root system uses much ground water, often to the detriment of other species. In many sites, it forms a pure stand that is almost impenetrable. Few to no plants grow under its canopy because of the high concentrations of salt that builds up in the soil from its accumulated leaf litter and the excretion of salt from glands on the leaves. Thus, with time, it changes the soil chemistry and reduces competition.

Management: Plowing, cutting, mowing, chaining, and burning are ineffective methods for controlling saltcedar. Flooding saltcedar for 1 or 2 years is effective if the water covers the tree or shrub. Herbicides are available for control, but saltcedar should not be disturbed for 2 years after application. This allows time for the chemical to move throughout and kill the root system. A mealy bug and a leaf beetle are available for biological control depending on the climatic and environmental conditions at the site.

African rue

Zygophyllaceae

Peganum harmala L.

Mature African rue plant.



Leaves are finely divided in long segments and the flowers have 5, white petals (left).



The green fruit of African rue contains many small seeds (right).

Peganum harmala L.

Origin: North Africa, Asia

Description: African rue is a multi-branched, perennial herb. It has short, creeping, horizontal **roots** and deep spreading roots that can grow over 20 feet deep in extremely dry soils. The plant usually does not grow over 24 inches tall and 36 inches wide. Its smooth, alternate **leaves** are finely and deeply divided with long, narrow segments. The **flowers** are borne on stiff stems from late spring through early fall and have 5, white petals with a yellow center. Many small **seeds** are produced in a green, 3-chambered **fruit**. African rue is poisonous to cattle, sheep, horses, and to humans. The most poisonous parts are the seeds, fruit, and young leaves. It reproduces primarily by seeds, but roots can produce new shoots.

Habitat Preferences: African rue grows in very alkaline, salty soils with little rainfall, and is well-adapted to arid climates. It is found in dry places such as roadsides, abandoned fields, gravel pits, and corrals. It has begun to spread in Mineral and Churchill counties in Nevada. It has also been found in California, Arizona, New Mexico, Idaho, Oregon, Washington, and western Texas.

Management: Maintaining a healthy plant community helps prevent African rue establishment. Mechanical control by mowing, cultivation, or burning is usually unsuccessful because the plant resprouts from the crown and lateral roots. These actions spread African rue. Continuously hand pulling seedlings or young plants may be effective. African rue is unpalatable and poisonous, so grazing is not recommended as a control measure. No biological control agents are available in the United States for African rue. Herbicides are available and should be applied repeatedly over several years to obtain control. After control is obtained, desirable vegetation should be established to prevent its re-invasion.

Syrian Beancaper

Zygophyllaceae

Zygophyllum fabago L.

Syrian beancaper is well-adapted to deserts.



Syrian beancaper grows to 36 inches tall and has thick, waxy leaves (above).

This plant has spreading roots that can produce new plants if disturbed (right).



Zygophyllum fabago L.

Origin: Asia

Description: Syrian beancaper is a perennial herb or forbe that produces a **taproot** when grown from a seed, and then develops a spreading root system. New plants develop from the spreading roots. Each year, coarse, thick **stems** are produced from the **crown** that become semi-woody before they die from cold weather. The rounded plant grows to 36 inches tall. The smooth, opposite **leaves** are thick, waxy, fleshy, and oblong-shaped. White to cream-colored **flowers** have a pinkish tinge, 5 petals, and are borne on the end of a long stalk. Each flower produces 10 long, showy, orange stamens. The **fruit** is an oblong, 5-sided cylinder with 5 chambers that contain a single **seed** each. Syrian beancaper reproduces by seed, spreading roots, and root pieces if the root system is disturbed by tillage or other damaging activities.

Habitat Preferences: This plant invades disturbed soils along roadsides, in corrals, around gravel pits, and construction sites. It is well-adapted to desert conditions including infrequent precipitation, drought, alkaline soils, and even saline soils.

Management: Mechanical disturbance of the root system, such as tillage and cultivation, will spread this weed unless frequently applied to exhaust the stored food reserves. Frequent hand pulling will control a young, small infestation. Mowing and burning to prevent viable seed production may weaken the plant and slow its spread, but the plant will resprout and can spread by the roots. Biological control is not available. Herbicides are most effective when surfactants are used because of the waxy leaves.

Glossary

- achene:** a small, dry, hard, indehiscent, 1-seeded fruit.
- acute:** sharp-pointed.
- alkaloid:** bitter, colorless, organic compounds (bases) found in numerous plants; many are poisonous if ingested.
- alternate:** leaf structure not opposite or whorled on stem.
- annual:** completing the life cycle in 1 growing season.
- apical:** situated at the tip.
- appressed:** pressed flat against another organ.
- ascending:** rising obliquely or curving upward.
- auricle:** an ear-shaped appendage.
- awn:** a terminal, slender bristle on an organ.
- basal:** relating to, or situated at the base.
- beak:** a prolonged firm tip, particularly of a seed or fruit.
- bearded:** bearing long stiff hairs.
- biennial:** completing the life cycle in 2 growing seasons.
- bract:** a reduced leaf subtending a flower.
- bud:** an undeveloped stem, leaf, or flower.
- calyx:** external, usually green, whorl of a flower, contrasted with the inner showy corolla (petals).
- capsule:** dry, dehiscent fruit composed of more than 1 carpel.
- ciliate:** fringed with hairs on the margin.
- corolla:** collectively the petals of a flower.
- cotyledon:** the primary leaf or leaves of the embryo.
- creeping:** to grow along the ground or some structure.
- crown:** the persistent base of an herbaceous perennial.
- dehiscent:** opening spontaneously when ripe to release the contents, as an anther or seed vessel.
- dentate:** having the margin cut with sharp teeth.
- dioecious:** flowers unisexual, the male and female flowers occur on different plants.
- divided:** said of leaves; deeply lobed, the sinuses extending to the base of the leaf or midrib.
- entire:** margins smooth without teeth or lobes.
- ephemeral:** lasting for a day or less.
- flower:** seed-producing structure of a plant.
- fruit:** ripened ovary and its associated structures that enclose it at maturity.
- glabrous:** smooth, no hairs present.
- glandular:** bearing glands; glandular hairs have glands or a sticky substance at the end.
- glaucous:** covered or whitened with a bloom.
- glumes:** chaff-like bract; used for the 2 lower empty bracts of a grass spikelet.
- habitat:** the normal situation in which a plant lives.
- herb:** a plant without persistent woody stem, at least above ground.

herbaceous: pertaining to an herb; leaf-like in color and texture; a non-woody plant; dying to the ground each year.

hybrid: a cross between two species.

indehiscent: not splitting open, as an achene.

inflorescence: flowering part of a plant; generally used for flowering cluster.

involucre: a whorl of bracts (phyllaries) below a flower cluster, as in the flower heads of the Composite family.

lanceolate: lance-shaped; several times longer than wide, broadest toward the base and pointed at the apex.

lateral: borne on the side of a structure or object.

leaf: flat thin part of a plant growing from the base or stem.

lemma: in grasses, the lower of the 2 bracts immediately enclosing the floret.

ligule: the strap-shaped part of a ray flower in the Composite family; the thin, collar-like appendage on the inside of the blade at the junction with the sheath in grasses.

linear: narrow and flat with sides or edges parallel as in a leaf.

lobed: bearing lobes; generally the sinuses are not halfway to the base of leaf or midrib, as in oak leaves.

midrib: the middle vein of a leaf.

monoculture: only one species present.

monoecious: having male and female flowers on the same plant.

node: the joint of a stem where a leaf originates.

oblanceolate: inversely lanceolate.

oblong: 2 to 4 times longer than wide with the sides nearly parallel as in a leaf.

obovate: inversely ovate.

ovate: shaped like a hen's egg in longitudinal section.

ovoid: solid ovate or solid oval.

palmate: in a leaf, having the lobes or divisions radiating from a common point.

pappus: a crown of bristles or scales on an achene.

perennial: a plant whose life cycle extends for 3 or more years.

persistent: remaining attached after like parts normally fall off.

petal: 1 of the leaves of a corolla.

petiole: a leaf-stalk.

phyllary: the name of the bract on the head of a sunflower.

pinnate: compound leaf with leaflets arranged on each side of a common petiole.

prostrate: lying flat upon the ground.

protrusion: a part of a structure that sticks out.

pubescent: covered with hairs; generally short, soft hairs.

raceme: a simple, elongated, indeterminate inflorescence.

ray flowers: generally the showy, strap-shaped flower as in the head of a sunflower; as opposed to the less showy disk or tube flower.

- recurved:** curved outward, downward, or backward.
- rhizomatous:** stem growing laterally partly or wholly beneath the soil.
- root:** the portion of the plant, generally below ground, that anchors the plant and absorbs moisture and nutrients from the soil.
- rosette:** dense, basal cluster of leaves arranged in a circular fashion about one point, usually at ground level.
- seed:** that part of the plant containing the mature embryo from which a new plant can grow.
- sepal:** a leaf or segment of the calyx.
- serrate:** with sharp teeth directed forward; often said of leaf edges.
- sessile:** without a stalk of any kind; said of a leaf or flower coming right off of a stem.
- simple:** of only one part; not divided into separate segments; not compound.
- spine:** a sharp-pointed, stiff, woody tissue.
- spore:** the reproductive body of lower plants, analogous to the seed.
- sporocarp:** a receptacle containing spores.
- stamens:** one of the pollen-bearing organs of a flower; male part; made up of filament and anther.
- stem:** the main stalk of a plant; supports leaves, flowers and fruit.
- stolon:** horizontal or creeping stem that roots at its nodes or tip producing a new plant.
- striate:** marked with longitudinal lines or furrows.
- taproot:** a primary stout vertical root giving off small laterals but not dividing.
- terminal:** of, or at the end of something.
- toothed:** a small marginal lobe; as on a saw, dentate.
- trichome:** plant hairs borne on leaves and stems.
- tuber:** a thickened, solid, and short underground stem with many buds.
- turion:** tuber-like tissue of aquatic plants.
- venation:** the arrangement of the veins of a leaf.
- whorled:** with 3 or more leaves or other structures growing at a node arranged in a circle around a stem.
- wings:** thin expansions bordering or surrounding a stem.
- winter annual:** an annual plant that germinates in the fall, completing its life cycle the following year.

Index of five digit plant codes from the Weed Science Society of America:

Common Name	Botanical Name	Plant Code
African Rue	<i>Peganum harmala</i>	PEGHA
Austrian fieldcress	<i>Rorippa austriaca</i>	RORAU
Camelthorn	<i>Alhagi pseudalhagi</i>	ALHPS
Canada thistle	<i>Cirsium arvense</i>	CIRAR
Common crupina	<i>Crupina vulgaris</i>	CJNVU
Dalmatian toadflax	<i>Linaria dalmatica</i>	LINDA
Diffuse knapweed	<i>Centaurea diffusa</i>	CENDI
Dyer's woad	<i>Isatis tinctoria</i>	ISATI
Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	MYPSP
Giant salvinia	<i>Salvinia molesta</i>	SAVMO
Green fountain grass	<i>Pennisetum setaceum</i>	PESSA
Hoary cress/Whitetop	<i>Cardaria draba</i>	CADDR
Houndstongue	<i>Cynoglossum officinale</i>	CYWOF
Hydrilla	<i>Hydrilla verticillata</i>	HYLLI
Iberian starthistle	<i>Centaurea iberica</i>	CENIB
Leafy spurge	<i>Euphorbia esula</i>	EPHES
Malta starthistle/ Tocalote	<i>Centaurea melitensis</i>	CENME
Mediterranean sage	<i>Salvia aethiopis</i>	SALAE
Medusahead	<i>Taeniatherum caput-medusae</i>	ELYCM
Musk thistle/ Nodding thistle	<i>Carduus nutans</i>	CRUNU
Perennial pepperweed/ Tall whitetop	<i>Lepidium latifolium</i>	LEPLA
Purple loosestrife	<i>Lythrum salicaria</i>	LYTSA
Purple starthistle	<i>Centaurea calcitrapa</i>	CENCA
Rush skeletonweed	<i>Chondrilla juncea</i>	CHOJU
Russian knapweed	<i>Acroptilon repens</i>	CENRE
Saltcedar/Tamarisk	<i>Tamarix ramosissima</i>	TAARA
Scotch thistle	<i>Onopordum acanthium</i>	ONRAC
Spotted knapweed	<i>Centaurea maculosa</i>	CENMA
Squarrose knapweed	<i>Centaurea virgata spp. squarrosa</i>	CENSQ
St. Johnswort/ Klamath weed	<i>Hypericum perforatum</i>	HYPPE
Sulfur cinquefoil	<i>Potentilla recta</i>	PTLRC
Syrian beancaper	<i>Zygophyllum fabago</i>	ZYGFA
Yellow starthistle	<i>Centaurea solstitialis</i>	CENSO
Yellow toadflax	<i>Linaria vulgaris</i>	LINVU

Nevada Cooperative Weed Management Area Groups

9/2003

Alpine County/Upper Carson Watershed
Carson City
Churchill County
Clark County
Clark County MSHCP Weeds Working Group
Elko County
Gerlach
Humboldt Watershed
Humboldt County Task Force
Lander County Weed Team
Las Vegas Wash
Lincoln County
Long Valley/Newark
Lower Truckee
Railroad Valley
Southern Nye County
Spring Creek Region
Storey County
Surprise Valley
Special Weed Action Team (Susanville)
Tahoe Basin Weed Coordinating Group
Tri-County
Truckee Meadows
Walker River Basin
Washoe Valley
West Central Lyon County
White River Valley

If you are interested in forming a cooperative weed management area working group, or you want to contact one of the cooperative weed management area groups listed above, call (775) 688-1182 ext. 269.

INVASIVE PLANT SURVEY

Return to : Dr. Wayne S Johnson

Department of Applied Economics and Statistics/204 OR

University of Nevada, Reno, Reno, Nevada 89557-0105

Fax: (775)784-4082; wjohnson@cabnr.unr.edu

Dave Pickel, GIS Coordinator

Natural Resources Conservation Service

5301 Longley Ln., Bldg. F, Rm. 201

Reno, Nevada 89511; dpickel@nv.nrcs.usda.gov

Date:

Time:

Recorder's Name:

Phone #:

Weed Name(s) and Code:

Infestation Estimate (area, percent infested, and/or # of plants):

Land Use (roadside, pasture, range, crop, facility, etc.):

Control Methods (mechanical, cultural, biological, chemical, and rate):

**Complete,
if known**

Township: _____

Range: _____

Section: _____

Latitude: _____

Longitude: _____

County: _____

UTM: _____

E _____

N _____

Check if GPS: ☐

Other Notes (site marked, descriptive location):

Feel free to duplicate this form (Use reverse for map)

MAP (sketch location with sufficient detail so that it can be found again)

Feel free to duplicate this form

INVASIVE PLANT SURVEY

Return to : Dr. Wayne S Johnson

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Date:

Time:

Recorder's Name:

Phone #:

Weed Name(s) and Code:

Infestation Estimate (area, percent infested, and/or # of plants):

Land Use (roadside, pasture, range, crop, facility, etc.):

Control Methods (mechanical, cultural, biological, chemical, and rate):

**Complete,
if known**

Township: _____

Range: _____

Section: _____

Latitude: _____

Longitude: _____

County: _____

UTM: _____

E _____

N _____

Check if GPS: ☐

Other Notes (site marked, descriptive location):

Feel free to duplicate this form (Use reverse for map)

MAP (sketch location with sufficient detail so that it can be found again)

Feel free to duplicate this form

INVASIVE PLANT SURVEY

Return to : Dr. Wayne S Johnson

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References:

Weeds of the West. 2000. T.D. Whitson, Ed. Western Society of Weed Science in cooperation with the Western United States Land Grant Universities Cooperative Extension Services, Newark, CA.

The Grower's Weed Identification Handbook. 1992. University of California, Division of Agriculture and Natural Resources, Oakland, CA. Publication 4030.

All photographs are courtesy of Weeds of the West except for the following:

Fountain grass flower, full plants, and flower spike photographs, Austrian fieldcress photographs, and hydrilla leaves and infestation photographs are courtesy of the California Department of Food and Agriculture, <http://pi.cdfa.ca.gov/weedinfo/Index.html>.

Fountain grass single plant photograph is courtesy of Joe DiTomaso, Weed Specialist, University of California Cooperative Extension.

Hydrilla growing tip image: USDA ARS Archives, USDA ARS, Image 0002158. Hydrilla plant image: USDA APHIS, Oxford North Carolina Archives, Image 1148070. Eurasian watermilfoil image: Fox, Alison. University of Florida, Image 1624031. Giant salvinia images: Bauer, Scott. USDA ARS, Image 1317055; Julien, Mic H. Commonwealth Scientific and Industrial Research Organization, Image 0002106; Robinson, Scott. Georgia Department of Natural Resources, Image 0001090. ForestryImages.org, <http://www.forestryimages.org/>.

Other Eurasian watermilfoil photographs are courtesy of Dave Spencer, USDA Exotic and Invasive Weeds Research Unit, Davis, CA.

Syrian beancaper photographs are courtesy of Jason C. Davison, Area Extension Specialist, University of Nevada Cooperative Extension.

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